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Qualitativ Examination of Challenges and Strategies to Sustainable Water Resources Management in Agriculture Sector in Kouhdasht Region in Lorestan Province

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Abstract: In Koudasht, Lorestan the ground water surface has severely decreased due to low precipitation and excessive and inappropriate use. It necessitates controlling the exploitation of ground water as well as pays more attention to water management. Thus present paper aims at identification and qualitative analysis of sustainable water resource management problem in Kouhdasht and presentation of relevant and sustainable strategies according to existing condition of Kouhdasht. Research methodology is qualitative grounded theory. Results are presented descriptively. Given the requirement of qualitative research method, the selected strategies for data collection were observation, semi structured and unstructured interviews, taking note, videos as well as analysis of all these. Research population was Jahad Agriculture Organization and water organization employers and farmers that work into watery farms of Kouhdasht. According the result the most important problems of sustainable water management in agriculture section of Kouhdashet were: low level of awareness and technical knowledge of farmers, financial problems of farmers to implement water optimal management and reply the loans, lack of budget allocated to water management plans and projects, excessive and illegal utilization of water, scattered lands, fragmented lands, share well. Also the most appropriate strategies are: holding training - extensional seminars, acculturation of optimal consumption of water resource, changing planting pattern, using improved cultural, mounting smart contour, water pricing, providing easy paying loan and pressure irrigation which are all being discussed in this paper.

Key word: water management challenges, problem, water management strategies, sustainable water management

INTRODUCTION

Water is one of the most important resources for every human society. The issue of preservation and optimal exploitation of water is the main challenges of present era. Meanwhile water and soil resources limitation due to climatic and geographical situation of country on one hand and the necessity of self - sufficiency in infrastructures on the other hand have mode the optimal exploitation of water and soil resources an important issue [1].

Iran with average precipitation of 249 mm in a year being one third of universal average is one of the dry countries of the world with limited resources [2]. Considering population growth, the yearly renewable water resources per capita was 7000 m^3 in 1956 and it reduced to 2000 m^3 in 1996. It is predicted that it reduces to 800 m^3 by 2022. It is too much less than water shortage limitation. Considering UN classification, Iran will experience the pressure by water shortage [3].

About %93 of renewable water resources is consumed in watery agriculture. The results of different researches show that water is wasted in different from in irrigation out pot varies between 33 to %37. It means that about %70 of resources is lost in the form of evaporation, percolation losses, drainage run-off and rivers which join the see or exit the country boundaries [4]. Water shortage in Iran, has changed its supply into a challenge in many parts of this country and this problem is gradually worsening. On the other hand the current alternative droughts have exacerbated the water crisis. Given the value of water in agriculture sector and its limitation as

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well as frequent drought, water consumption management and its optimal use are inevitable and necessary. During dry years, we are witness to water crisis which damages agriculture sector seriously. Water availability is so vital that country authorities have to take a systematic and strategic plan for water on which activities and economical development of country are based.

Literature Review: Panahi, considers near distance among deep wells and semi deep as a factor in decreasing ground water and drying semi deep wall. She believes that water consumption problems in agricultural sector are related to water loss during delivery from resources to farm and through the farm and plots [5]. Afshar, argues that the main challenges in optimal consumption of water are small – scale land possession, lack of land leveling and shaping, policies in pricing water rate and lack of skilled man power, who are specialized in water consumption management in state organizations and institutions [6]. Faraz, argues that one way to maximize irrigation efficiency is to use sprinkler and drip irrigation. Among the advantages of these kinds of irrigations are to water consumption saving, reduction in number of workers, possibility of irrigation on high gradient lands, irrigation of different types of soil and prevention of erosion [7]. Keramat zade and et al, proposes that suitable water pricing is a motivating tool for water consumption saving and prevention from its loss [8]. Mc cartney and et al, proposes that water storage is a strategy to deal with water storage. They introduce many ways for storing water in agriculture sector such as artificial ground water recharge of water table, pools or individual or family made tanks, water storage in soil, dams, small resources and rain water storage [9].

Owis and Hachum, propose some strategies for water management under the condition of water shortage including drainage management, reconsuming of water in farms, water pricing, rain water consumption and plant inbreeding [10].

MATERIAL AND METHODS

Research methodology is qualitative and is based on grounded theory. The paradigm of qualitative research allows researches to examine the issuer in more detail, in particular when it comes to examine different viewpoints. In this theory, the researcher begins to collect data using different techniques without any previous background on issue. Then through the analysis of collected data and encoding, the researcher gain a framework for the research based on which he can achieve the expected results. To collect data, techniques such as observation, semi structured and unstructured interviews, taking notes, shooting and recording were used. After multiple studies of the above mentioned and acquiring the required information, then analyzed them. All these processes aimed at identification and examination of challenges in sustainable management of water resources in agriculture sector of Lorestan under drought condition as well as detection of appropriate and possible strategies given the current status of this sector. Research participants were of two groups:

- Experts in affiliated organizations to water resources management in agriculture sector in Kouhdasht (15 subjects)
- Water planting farmers in Kouhdasht (20 subjects)

In order collect data from experts, systematic sampling accompanied by snowball sampling techniques were used. In systematic sampling some experts were deliberating selected to take part in these resources. They were competent experts and had enough experience regarding the issue. Meanwhile they had willingness to participate. Combined with snowball sampling techniques the number of participants was gradually increased. Since there was some information whose existence we were unaware about we asked participants to introduce some if there were. Thus we paved the way for participation of all informed and knowledgeable experts. To select formers, a random and systematic sampling technique was applied. Given some expected characteristics, farmers were introduced by experts. Some of them were randomly selected.

RESULTS AND DISCUSSION

Following the analysis of data collected through qualitative research method, the results of information acquired from experts and farmers regarding current challenges in sustainable management of water resources in Kouhdasht presented as follow:

The problem of sustainable water resources management in Agriculture sector:

Low Awareness and Managerial and Technical Knowledge: Unfamiliarity and unawareness of different techniques for management in farms and attributes of each technique as well as their application are among main problems. Lack of knowledge about turn and irrigation schedule, length of each irrigation period considering

the type of crop and characteristics of region especially under drought condition, kind of plough, shrub and grain stand suitable for low drought condition, type of appropriate irrigation system considering soil texture and plant water requirement, irrigation system suitable for steep lands, canals and ditches destruction, the disadvantage of plant debris burning, straw and stubble, necessity of elimination of weeds around canals, necessity of continuous and due visit, reduction of water path length in farms, land leveling increase water loss in farms and its lack of sustainable management for example lack of awareness about water for their growth and treatment result in excessive and permanent use of water resource during plant treatment.

Traditional Agriculture: Most farmers in this area are small scale farmers who live on agriculture. It means that they only care about immediate and short term benefits. They don't care about the importance of water as vital and valuable element. The small - scale farmers just think about their everyday living. It is just enough for them to spend the current crops year without any special challenge. They don't take risk and don't want to put their families in jeopardy. It doesn't matter for them that through using traditional techniques of water consumption they will encounter with water shortage in future.

Low Cost or Free Water: The low cost of water or sometimes having no charge is the main reason for water loss by farmers. Basically when a product has no charge, it is depreciated and consumers devalue it. No attempt is made for its appropriate consumption. By the year 2004 in our country the water company charged the farmers for agriculture well and rivers water. But according to parliament law this water rate was omitted by then during the recent year farmers being challenged by financial problem for not paying water price and faced with severe water shortage due to recent drought, don't plant for optimal consumption of limited water resources. They have changed water shortage to a serious crisis.

Excessive Water Exploitation: Drilling wells deeper than the allowed depth mentioned in well drilling permission and pumping engine installment more powerful than the allowed capacity with thicker pipes and temporal surveillance of authorities just during earlier stage of well drilling - making them unaware of farmers later unlawful activities are among other problems according to this area's farmers.

Small Scale Land: Small agriculture and shared well due to low cost - efficiency changed new irrigation system in to challenge. Unifying all farmers and attaining a widely accepted agreement for managerial planning in water consumption is very time consuming and bring along a lot of challenges.

Land Scatting: Multi plot and scattering agriculture lands and their distances waste a lot of time for farmers to treat them. In addition these factors result in water loss through the path along the farms. That's why farmers can not use the available water optimally. Mean while cost - inefficiency makes pressure irrigation system application impossible. Small scale land and long distances of lands are main problems of sustainable water management in Kouhdash.

Lack of Financial Credits and Allocated to Water Management Projects in this Area: Lack of financial credits and allocated budget for water resources management plans or projects on macro level, in particular dams under constructions and building water pumping station for artificial ground water recharge and flood walls is a great problem. Low and insufficient credit allocated for completion of projects under construction make completion of these projects impossible or if possible, it takes a lot of time. Delayed completion of a project results in negative out put and inefficiency.

Financial Problems of Farmers: Low income level of farmer has practically made application of water management strategies impossible. Though they are willing to implement managerial activities such as cementation and coating, application of pipes for water delivering and pressurized irrigation system, terracing steep lands, fallowing lands for one year in order to increase soil moisture, farmers can't implement these techniques due to financial problems.

In additional farmers financial difficulties in loan repayment and providing assurance prevent them from using loan credit allocated to these projects.

The Existence of Shared Wells and Lack of a Unified Management: Proliferation of partners to use water in one well prevent them from implementing water management techniques such as night irrigation or multi purpose consumption of water (Fish - culture or intercropping using surplus water).

When water is consumed in partnership its consumption is possible only during special hours of day and night. Their turn may be in midday or during hot hours of a day so farmer has no opportunity consume water during better and cold hours of day or even at night. The same is true for multi purpose consumption of water. Because when water resources are private it is possible to use it in variety of products. Otherwise this possibility is too weak.

Sustainable Water Resources Strategies in Agriculture Sector

Training – Extensional Classes: Promotion of technical knowledge of farmer regarding sustainable water management through workshops, training classes or through different education methods in villages such as result presentation and visit the sample farmers can enhance knowledge and technical information of farmers for water resources management.

Optimal Water Consumption Acculturation: According to the experts and farmers informing people and enhancing cultural level and general understanding and valuing this vital element in order to consume water resources appropriately through mass media or broad casting expert programs and producing clips and animations in radio and TV and publishing brochures are all necessary activates that help optimal water consumption acculturation. They are appropriate strategies.

Culture Pattern Change and Selection of Crops Based on Hydro Climate in Region: According to farmers and expert views selection of crop, having in mind the amount of available water or climate of region as well as substitution of crops which have low water requirements or resistant to drought situation or those having shorter growth period for crops with high water requirements and longer growth periods, are among efficient strategies to consume less water especially under critical situation.

Improved Cultivars: Introducing improved grains with genetic changes for increasing resistance to drought stress, diseases and pests attacks or with reduced treatment period by agriculture research centers motivates farmers to apply appropriate strategies to deal with drought conditions. For example in Kouhdash planting improved cultivars like Kouhdash or Zagros wheat as relay intercropping of corn which is the dominant crop of this region with high water requirement was practiced and farmers welcome this technique.

Intelligent Contour Installment: Installing intelligent contours is strategy which is extensively researched by experts and water organization authorities of region and Jahad Keshavarzi organizations. They are adjusted for a certain volume of water of water for each period. When the farmer consumes this certain amount of water it automatically switches off water and electricity. This water volume is determined based on amount of area or the type of cultivation and water requirements of crops. Kouhdasht plain has been selected as pilot plain in this area. Experimentally these contours have been in Kouhdash when intelligent contour is mounted for water resource, farmers have to make planning for their available water based on amount of area as well as the kind of cultivated crops.

Otherwise it is possible that this water volume is consumed in a short period of time and contour automatically switches off water. In that case farmers will have no opportunity to consume extra water. Although the proposed plan is widely accepted by experts, some farmers have not faced with any limitation in water consumption.

Water Pricing: Except few farmers all experts believe that determination of water rate is vary important strategy for optimal water consumption. It doesn't make water as a free and invaluable product. So its significance receives more attention. In addition to water pricing, extra consumption punishment paradigm should be incorporated so that those farmers who consume water beyond the allowed limits have to pay extra for it. Few farmers believed that agriculture wouldn't be cost efficient in that case.

Pressurized Irrigation Application: A fundamental strategy to efficiently water resource management in agriculture sector is the application Pressurized irrigation system instead of traditional irrigation methods. According to the experts, presently farmers are supported to apply these systems. 14000000 Rials loan per hectar and 27000000 Rials low interest rate loan are paid to farmers. These measures motivate farmers to use the new irrigation systems along with new opportunities.

Low Interest Rate and Easy - Paying Loans: One of the problems that farmers experience for borrowing loan and government credits is lack of guarantees and their high interest rate. Farmers who area vulnerable class

encounters serious problems for loan repayment with high interest rate and providing the above mentioned documents.

There for they cannot use these credits for sustainable water resources management such as establishment of sprinkler irrigation systems, water supply canals cementation, pipelining for water delivery etc.

Providing low interest rate and easy paying loan is an efficient measure taken.

CONCLUSION

A prevailing problem in this region especially Kouhdasht which more sever than any other district, is ground water level depression. In kouhdasht region irrigation is applied mostly based on ground water resources. The inappropriate and excessive exploitation of these resources have considerably decreased ground water level.

In Kouhdasht ground water depression is 5-9 meters in a year. During drought condition in 2007-2009, ground water table has decreased by 30 meters. The depth of deep well was 50-60 meters in the past but it is now 120 meters. In addition the amount of water yield in these well has reduced considerably. In necessitates controlling ground water exploitation and preventing from excessive exploitation as well as paying more attention to water management and its optimal consumption. The challenges and problems have been always obstacles on optimal water resources management in agriculture sector. To over com these barriers it is necessary to identify the problems propose suitable strategies based on current conditions. According to the results, we can classify the problems for water resources sustainable management in Kouhdasht in to main economic and managerial problems. Economic problems are living on agriculture that makes farmers follow short – term goals and they don't care about sustainability of production and resources.

Low cost of agriculture water results in a condition in which farmers don't consider water as national asset.

Lack of financial and credit allocated to water management projects and plans wear out the projects and makes them inefficient. Financial problems of farmers in implementation of water resources sustainable management strategies which are costly and their difficulty in loan repayment are factors that prevent farmers from cooperation in spite of their willingness and awareness of these Strategies.

Another group, management problems include excessive exploitation of water due to temporal surveillance of authorities which is confined to the early stages of well drilling, having small - scale lands and be scattered lands which minimizes the possibility of implementation as well as cost effectiveness of these techniques. Existence of shared wells and lack of a unified management have challenged widely accepted agreement on optimal water consumption management. Low awareness and managerial as well as technical knowledge are among the fundamental problems for water management which shadow other factors. The proposed strategies in present paper are all strategies suitable for current situations. They are partly being implemented. Thus taking these strategies seriously will results in good out comes in sustainable water resources management.

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